PATENT ABSTRACTS OF JAPAN

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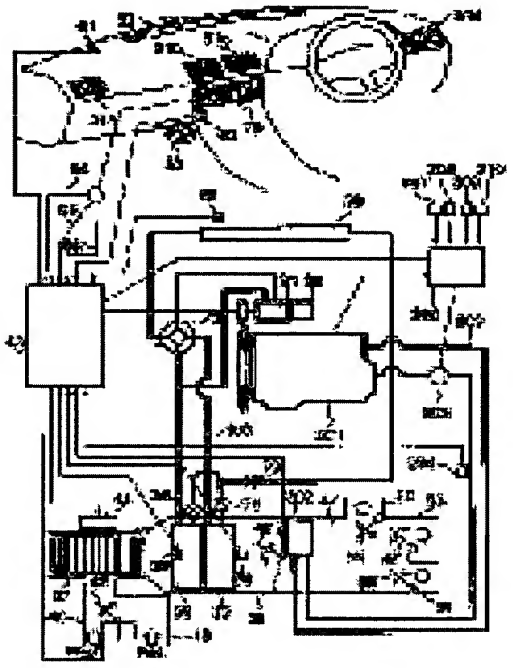
(54) AIR CONDITIONER FOR VEHICLE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a method of selecting engine driving or motor driving during dehumidifying-heating operation in an air-conditioning cycle capable of dehumidifying-heating operation and cooling operation, provided with a compressor driven by an engine and a motor, and to provide a method of selecting engine driving or motor driving during cooling operation in an air-conditioning cycle capable of cooling operation.
SOLUTION: In a hybrid air-conditioning system, an air-conditioning load detecting means, a compressor load computing means and a compressor driving method determining means are provided, and compressor driving by an engine or compressor driving by a motor is selected according to the air-conditioning load and compressor driving load of a vehicle.



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[Claim(s)]

[Claim 1] The hybrid air-conditioner system which consisted of one piece or two or more vehicle indoor heat exchangers which were put on the engine for a vehicles drive, the compressor driven by the motor and the vehicle outdoor heat exchanger put on vehicle outdoor characterized by providing the following, and the vehicle interior of a room, and an expansion means. An air-conditioning load detection means to detect the air-conditioning load of vehicles. A compressor load operation means to calculate the drive load of the aforementioned compressor with the signal from the aforementioned air-conditioning load detection means. A compressor drive method determination means by which the signal of the aforementioned compressor load operation means determines any of the compressor drive with the aforementioned engine, and the compressor drive by the aforementioned motor they are.

[Claim 2] The air conditioner for vehicles characterized by applying to the vehicles equipped with the motor only for compressors in the air conditioner for vehicles according to claim 1.

[Claim 3] The air conditioner for vehicles characterized by applying to the hybrid vehicles exceptionally equipped with the motor for a vehicles drive, or idle stop vehicles in the air conditioner for vehicles according to claim 1 or 2.

[Claim 4] The air conditioner for vehicles characterized by having the idle stop system which stops the compressor drive with an engine in the air conditioner for vehicles according to claim 1 to 3 at the time of an idle.

[Claim 5] The air conditioner for vehicles characterized by ON-OFF [the aforementioned compressor] according to the air-conditioning load detected by the aforementioned air-conditioning load detection means in the air conditioner for vehicles according to claim 1 to 4.

[Claim 6] The air conditioner for vehicles characterized by driving the aforementioned compressor with the aforementioned engine when the air-conditioning load detected by the aforementioned air-conditioning load detection means is large in the air conditioner for vehicles according to claim 1 to 5.

[Claim 7] It is the air conditioner for vehicles characterized by always driving the aforementioned compressor in the higher one of the efficiency an engine drive and motorised in the air conditioner for vehicles according to claim 1 to 6.

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the air conditioner for vehicles, and the air conditioner for vehicles more specifically equipped with the vapor compression cycle which makes a vehicle outdoor heat exchanger and a vehicle indoor heat exchanger circulate through a refrigerant by the drive of a compressor.

[0002]

[Description of the Prior Art] Generally, the vehicles equipped with the conventional engine are performing vehicle indoor air-conditioning using the cold blast obtained by driving a compressor with an engine, and the warm air obtained using an engine cooling water.

[0003] However, in hybrid vehicles or idle stop vehicles, when it was hybrid vehicles, when it was idle stop vehicles at the time of a motor run and a stop, it was engine un-operating, respectively at the time of a stop, and the technical problem of sufficient vehicle indoor air-conditioning becoming impossible occurred.

[0004] On the other hand, as an air conditioner for vehicles with which required vehicle indoor air-conditioning was obtained while lessening engine performance as much as possible, the air conditioner currently indicated by JP,10-258629,A is known, for example.

[0005] If an air-conditioning load is smaller than a predetermined value and the blow-off air temperature of a vehicle indoor heat exchanger is lower than predetermined temperature when carrying out an engine shutdown at the time of air conditioning [whether an air-conditioning load becomes larger than a predetermined value by changing inside-and-outside mind mode to bashful circulation mode compulsorily, and maintaining the feeling of air conditioning of the vehicle interior of a room in the cold energy of a vehicle indoor heat exchanger, and] Or if the blow-off air temperature of a vehicle indoor heat exchanger becomes higher than predetermined temperature, an engine shutdown is forbidden and it is made to drive a compressor with an engine.

[0006] Moreover, if an air-conditioning load is smaller than a predetermined value and water temperature is higher than predetermined temperature when carrying out an engine shutdown at the time of heating [whether an air-conditioning load becomes

larger than a predetermined value by changing inside-and-outside mind mode to bashful circulation mode compulsorily, and maintaining the feeling of heating of the vehicle interior of a room in the heat of a heater core, and] Or if water temperature becomes lower than predetermined temperature, an engine shutdown is forbidden, an engine is turned on and it is made to supply warm water to a heater core.

[0007]

[Problem(s) to be Solved by the Invention] However, since the blow-off temperature rose by about 10 degrees C and the humidity of vehicle indoor air also became high when the engine shutdown was carried out and carried out to the bashful mode with the conventional air conditioner for vehicles at the time of air conditioning, the comfortable feeling of the vehicle interior of a room is not only spoiled, but there was a problem that the smell from a vehicle indoor heat exchanger occurred.

[0008] By driving a compressor by the motor and performing air conditioning operation as one of the solution meanses of such a problem, at the time of an engine shutdown, the rise of a blow-off temperature or vehicle indoor humidity is suppressed, and how to prevent stinking thing generating from a vehicle indoor heat exchanger can be considered.

[0009] On the other hand, since the blow-off temperature fell by about 10 degrees C and the humidity of vehicle indoor air became high when the engine shutdown was carried out and carried out to the bashful mode at the time of heating, there was a problem that the cloudiness of a windowpane occurred.

[0010] Moreover, by hybrid vehicles or idle stop vehicles, compared with the vehicles of the conventional equivalent class, it is more small and efficiency mounts a good engine. Therefore, there was also a problem that an engine shutdown could not be performed since the heating demand of the vehicle interior of a room is not high or water temperature does not rise to predetermined temperature in the conditions that outside air temperature is low.

[0011] How to drive a compressor by the engine or the motor and to perform heating operation as one of the solution meanses of such a problem using the possible air-conditioner cycle of dehumidification heating operation and air conditioning operation at the time when water temperature is lower than predetermined temperature, or the time of an engine shutdown can be considered.

[0012] Dehumidification heating operation of this air-conditioner cycle can raise engine water temperature to predetermined temperature in a short time, maintaining a high heater performance, though it is not only compatible in antifog maintenance of a heating performance and glass, but outside air temperature fell or engine calorific value

decreased, reducing the amount of open air introduction to the vehicle interior of a room.
[0013] While this invention offers the selection method of the engine drive at the time of dehumidification heating operation, and motorised, in the possible air-conditioner cycle of an engine, dehumidification heating operation equipped with the compressor driven by the motor, and air conditioning operation, in the air-conditioner cycle in which air conditioning operation is possible, it is the purpose to offer the selection method of the engine drive at the time of air conditioning operation and motorised.
[0014]
[Means for Solving the Problem] In order that this invention may solve an above-mentioned technical problem, invention according to claim 1 In the hybrid air-conditioner system which consisted of one piece or two or more vehicle indoor heat exchangers which were put on the engine for a vehicles drive, the compressor driven by the motor, the vehicle outdoor heat exchanger put on vehicle outdoor, and the vehicle interior of a room, and an expansion means With the signal from an air-conditioning load detection means to detect the air-conditioning load of vehicles, and the above-mentioned air-conditioning load detection means It has a compressor drive method determination means to determine any of the compressor drive with the above-mentioned engine, and the compressor drive by the above-mentioned motor they are, with the signal of a compressor load operation means to calculate the drive load of the above-mentioned compressor, and the above-mentioned compressor load operation means.
[0015] Invention according to claim 2 applies invention according to claim 1 to the vehicles equipped with the motor only for compressors.
[0016] Invention according to claim 3 applies a claim 1 and the air conditioner for vehicles according to claim 2 to the hybrid vehicles and idle stop vehicles which were exceptionally equipped with the motor for a vehicles drive.
[0017] Invention according to claim 4 is equipped with the idle stop system which stops the compressor drive with an engine in the air conditioner for vehicles according to claim 3 at the time of an idle from a claim 1.
[0018] ON-OFF [invention according to claim 5 / claim / 1 / the above-mentioned compressor] according to the air-conditioning load detected by the above-mentioned air-conditioning load detection means in the air conditioner for vehicles according to claim 4.
[0019] Invention according to claim 6 drives the above-mentioned compressor with the above-mentioned engine, when the air-conditioning load detected by the above-mentioned air-conditioning load detection means in the air conditioner for

vehicles according to claim 5 from the claim 1 is large.

[0020] Invention according to claim 7 always drives the above-mentioned compressor in the air conditioner for vehicles according to claim 6 in the higher one of the efficiency an engine drive and motorised, from a claim 1.

[0021] Hereafter, an operation of this invention is explained. In the hybrid air-conditioner system which consisted of one piece or two or more vehicle indoor heat exchangers which were put on the engine for a vehicles drive, the compressor driven by the motor, the vehicle outdoor heat exchanger put on vehicle outdoor, and the vehicle interior of a room according to invention according to claim 1, and an expansion means With the signal from an air-conditioning load detection means to detect the air-conditioning load of vehicles, and the above-mentioned air-conditioning load detection means With the signal of a compressor load operation means to calculate the drive load of the above-mentioned compressor, and the above-mentioned compressor load operation means It has a compressor drive method determination means to determine any of the compressor drive with the above-mentioned engine, and the compressor drive by the above-mentioned motor they are. According to the air-conditioning load and compressor drive load of vehicles, the compressor drive with an engine and the compressor drive by the motor are chosen.

[0022] Consequently, while the compressor drive by the motor is chosen, even if it suspends an engine, it becomes possible to maintain the air-conditioning state of the vehicle interior of a room. Moreover, it becomes possible to drive a compressor in the direction with the sufficient efficiency an engine drive and motorised.

[0023] Since invention according to claim 1 is applied to the vehicles equipped with the motor only for compressors according to invention according to claim 2, in addition to an operation of invention according to claim 1, it becomes possible to change the specification of a motor easily according to the specification of vehicles, such as battery capacity and body size.

[0024] Since a claim 1 and the air conditioner for vehicles according to claim 2 are applied to the hybrid vehicles and idle stop vehicles which were exceptionally equipped with the motor for a vehicles drive according to invention according to claim 3, it becomes possible to perform the engine shutdown at the time of an idle, without sacrificing an air-conditioning performance. Moreover, since a compressor is driven in the direction with the sufficient efficiency of a motor and an engine, it becomes possible to mitigate aggravation of the mpg by the air-conditioner.

[0025] Since it has the idle stop system which stops the compressor drive with an engine in the air conditioner for vehicles according to claim 3 at the time of an idle from a claim

1 according to invention according to claim 4, at the time of an idle, a compressor is changed to motorised, and it enables vehicles to perform an engine shutdown.
[0026] Since ON-OFF [according to invention according to claim 5 / claim / 1 / the above-mentioned compressor] according to the air-conditioning load detected by the above-mentioned air-conditioning load detection means in the air conditioner for vehicles according to claim 4, it becomes possible to prevent the increase in the engine load by useless compressor drive, or a battery load, aggravation of mpg, etc.
[0027] It becomes possible to secure the amenity of the vehicle interior of a room, without spoiling cooling-down capacity and warm-up capacity, since the above-mentioned compressor is driven with the above-mentioned engine, when the air-conditioning load detected by the above-mentioned air-conditioning load detection means in the air conditioner for vehicles according to claim 5 from the claim 1 is large according to invention according to claim 6.
[0028] According to invention according to claim 7, since the above-mentioned compressor is always driven in the air conditioner for vehicles according to claim 6 in the higher one of the efficiency an engine drive and motorised, from a claim 1, it becomes possible to mitigate aggravation of the mpg by the air-conditioner.
[0029]
[Embodiments of the Invention] Hereafter, the gestalt of 1 operation of the air conditioner for vehicles by this invention is explained in detail with reference to an accompanying drawing. Drawing 1 is the outline block diagram showing the gestalt of 1 operation of the air conditioner for vehicles by this invention.
[0030] First, composition is explained. In drawing 1 , a compressor 31 is driven by the engine 201, or both or either 30, if a compressor clutch is ON, it will be driven with an engine 201 through a belt (not shown), if a motor 30 is ON, it will be driven by the motor 30, and if both a compressor clutch and the motor 30 are OFF, it will stop.
[0031] The inlet side of the discharge side of a compressor 31, the vehicle outdoor heat exchanger 38, the 2nd vehicle indoor heat exchanger 33, and a compressor 31 is connected to the four way valve 73 as refrigerant passage means for switching. While it will be in a passage switch state like ****** at the time of a heating setup and the inlet side of the discharge side of a compressor 31, the 2nd vehicle indoor heat exchanger 33 and the vehicle outdoor heat exchanger 38, and a compressor 31 is open for free passage, respectively At the time of an air conditioning setup, it will be in a passage switch state like ******, and the inlet side of the discharge side of a compressor 31, the vehicle outdoor heat exchanger 38 and the 2nd vehicle indoor heat exchanger 33, and a compressor 31 is open for free passage, respectively.

[0032] The vehicle outdoor heat exchanger 38 is formed in vehicle outdoor, and has become the vehicle outdoor capacitor which radiates heat in the open air about the heat of the refrigerant breathed out from a compressor 31.

[0033] The 1st vehicle indoor heat exchanger 35 and the 2nd vehicle indoor heat exchanger 33 are arranged in a duct 39. While the end of the 1st vehicle indoor heat exchanger 35 is connected to refrigerant inhalation of a compressor 31, the other end is connected to the expansion valve 34 as an expansion means and the compressor 31 is operating, the air which it always became a heat sink and was ventilated by the blower fan 37 is cooled.

[0034] The end of the 2nd vehicle indoor heat exchanger 33 is connected to a four way valve 73, and the other end is connected to a check valve 71. When it changes into the state where the 2nd vehicle indoor heat exchanger 33 turns into a radiator when a four way valve 73 is set to a heating side, heating operation is performed and a four way valve 73 is set to an air conditioning side, with a check valve 71, it will be in the state where a refrigerant does not flow to the 2nd vehicle indoor heat exchanger 33, and air conditioning operation will be performed. A check valve 70 prevents that the refrigerant condensed with the 2nd vehicle indoor heat exchanger 33 flows into the vehicle outdoor heat exchanger 38, when a four way valve 73 is set to a heating side.

[0035] Moreover, the heater core 202 is formed in the lower stream of a river of the 2nd vehicle indoor heat exchanger 33, and an engine cooling water flows into a duct 39. 203 is engine-cooling-water piping.

[0036] The bashful inlet 40 which introduces vehicle indoor air, and the open air inlet 41 which introduces the open air in response to a run wind pressure are formed in the upstream rather than the 1st vehicle indoor heat exchanger 35 of a duct 39. The intake door 42 which opens and closes the bashful inlet 40 and the open air inlet 41 by arbitrary ratios is formed in the portion by which this bashful inlet 40 and the open air inlet 41 branch. an intake door 42 -- opening -- the intake door opening Xint -- the amount of open air introduction -- zero -- full -- the position which becomes bashful is set up with Xint=0%, and the position used as full open air introduction is set up with Xint=100% Between an air introduction-with bashful inlet 40 and open air inlet 41 side (downstream of an airstream), and the 1st vehicle indoor heat exchanger 35, the blower fan 37 is stationed and a rotation drive is carried out by the blower fan motor 44 driven with a control unit 43.

[0037] The air mix door 46 is formed in the downstream of the 2nd vehicle indoor heat exchanger 33. This air mix door 46 is opened and closed so that the rate of the air which passes the down-stream heater core 202, and the air not passing may be adjusted with

the air mix door actuator outside drawing driven with a control unit 43. The air mix door 46 can carry out adjustable [of the heater core passage air capacity], and serves as a heater air-capacity adjustable means. The air mix door 46 serves as a position of **********, and the opening slack air mix door opening Xmix of the air mix door 46 sets up the time of the air which passes the heater core 202 serving as zero with Xmix=0% (a close by-pass bulb completely, Full COOL), and sets up the time of the air mix door 46 serving as a position of **********, and all air passing the heater core 202 with Xmix=100% (full open, Full HOT).

[0038] The air mix chamber 47 as a room which makes the air-conditioning wind by which temperature control was carried out is formed in the downstream by improving mixture with the above-mentioned cold blast and warm air rather than the heater core 202 of a duct 39. The ventilator outlet 51 which blows off an air-conditioning wind towards the upper half of the body of the candidate crew outside drawing, the foot outlet 53 which blows off an air-conditioning wind towards candidate crew's step, and the defroster outlet 52 which blows off an air-conditioning wind towards the front window glass outside drawing are formed in the air mix chamber 47. In the air mix chamber 47, the ventilator door 55, the foot door 57, and the defroster door 56 are formed. The ventilator door 55 opens and closes the ventilator outlet 51 with the ventilator door actuator outside drawing driven with a control unit 43. The foot door 57 opens and closes the foot outlet 53 with the foot door actuator outside drawing driven with a control unit 43. The defroster door 56 opens and closes the defroster outlet 52 with the defroster door actuator outside drawing driven with a control unit 43. The opening slack defroster door opening Xdef of the defroster door 56 sets up the position where the defroster outlet 52 serves as a close by-pass bulb completely with Xdef=0%, and sets up the position where the defroster outlet 52 is opened fully with Xdef=100%.

[0039] A control unit 43 The 1st vehicle indoor heat exchanger operation temperature sensor 59 The 2nd vehicle indoor heat exchanger blow-off air temperature sensor 60 The operation temperature Teva of the 1st vehicle indoor heat exchanger 35 obtained from heat environmental-information input meanses, such as the intensity-of-radiation sensor 61, the outside-air-temperature sensor 62, the room temperature sensor 63, the room temperature setter 64, the outlet mode switch 65, the blower fan motor switch 66, and the engine-cooling-water ** sensor 204 By heat environmental information, such as the blow-off air temperature Tvsc of the 2nd vehicle indoor heat exchanger 33, the intensity of radiation Qsun of vehicles, and vehicle outdoor OAT Tamb and the detection temperature (the degree of vehicle room air temperature) Tic of the vehicle interior of a room, the setting temperature Tptc of the vehicle interior of a room, and

water temperature Tw Target air conditioning conditions, such as the air mix door opening Xmix, the intake door opening Xint, the defroster door opening Xdef, and air capacity Veva, the degree Tof of target blow-off temperature, are calculated. So that the target air conditioning conditions that above-mentioned the operation of the air conditioning conditions of the vehicle interior of a room was carried out may be maintained The blower fan motor 44, an intake door actuator, an air mix door actuator, a ventilator door actuator, a foot door actuator, a defroster door actuator, etc. are driven.

[0040] The control unit 43 has also achieved the duty of the compressor drive method determination means which determines whether to drive a compressor 31 with an engine 201, to drive by the motor 30, or turn off while serving as a compressor load operation means to predict the drive load of a compressor 31 based on the signal from an air-conditioning load detection means to detect the air-conditioning (air conditioning heating) load of an air-conditioner.

[0041] An engine control system 206 is a control unit of an engine 201, inputs each sensor recognition value from the throttle opening sensor 207, the vehicle speed sensor 208, an engine speed sensor 209, the run mode sensor 210, an air-conditioner working-pressure sensor (not shown), etc., and serves as a vehicles state judgment means to judge whether vehicles are in a predetermined engine shutdown possible state, and whether the engine 201 is turned on for a run.

[0042] Moreover, the engine control system 206 outputted signals, such as a vehicles state signal, an impossible engine speed, an impossible air-conditioner working pressure, etc. in which an engine shutdown is possible, to the control unit 43, inputted the engine performance demand signal into it from the control unit 43, and has also played the role of the engine control means which control operation un-operating [of an engine 201] according to the vehicles state and the engine performance demand.

[0043] Moreover, an engine control system 206 performs operation non-operating control of the electric water pump 205. When a heating demand has an engine 201 from the vehicle interior of a room by un-operating, an electric water pump is operated and a heater 202 is made to circulate through engine warm water.

[0044] In addition, it is not illustrated by drawing 1 , although a radiator is formed after the vehicle outdoor heat exchanger 38, an engine cooling water flows also here and heat is radiated in the open air by actual vehicles. Moreover, although the heater core which used the engine cooling water as a heating means is made into an example and the gestalt of this operation explains it, you may use heating meanses, such as an electric heater and a combustion heater.

[0045] Drawing 9 shows the flows of control of operation non-operating control of the

engine in the gestalt of this operation. A hybrid car is equipped with the engine and motor for a vehicles drive, and it runs a motor by the motor and it runs a motor with an engine below at the predetermined vehicle speed above the predetermined vehicle speed.

[0046] If operation non-operating control of an engine is started at Step S1, each sensor value will be detected at Step S2. The vehicle speed is detected from the vehicle speed sensor 208, an engine speed is detected from an engine speed sensor 209, throttle opening is detected from the throttle opening sensor 207, and an engine performance demand signal is incorporated [from the run mode sensor 210, run states, such as an engine run state or a motor run state, are detected, an air-conditioner working-pressure signal is detected, and] from a control unit 43.

[0047] At Step S3, even if there are few sensor values detected at Step S2, it is based on one or more. Whether vehicles are in an acceleration run state, whether it is in a regular run state, and whether it is in a slowdown run state When the vehicles state whether to be in a stop state was judged, and it checks on predetermined conditions and is judged as an engine shutdown possible state, it progresses to Step S4, and when it is judged as an engine shutdown impossible state, it progresses to Step S5.

[0048] At Step S4, it judges further whether there is any engine performance demand from a control unit 43, when there is an engine performance demand, it progresses to Step S5, and when there is no compressor operation demand, it progresses to Step S6.

[0049] At Step S5, an engine is set as an operating state, on the other hand, by Step S6, an engine is set as a non-operating state, it returns to Step S2 again, and above-mentioned engine performance non-operating control is repeated.

[0050] The above is the same also as an idle stop vehicle by which an engine turns off at the time of an idle, and an engine is turned on [it] except an idle, although the hybrid car was made into the example and explained.

[0051] Drawing 10 - drawing 14 show the flows of control in the case of performing dehumidification heating operation (following, only heating operation) in the air-conditioner cycle of the form of operation shown in drawing 1 .

[0052] The refrigerant gas of elevated-temperature high pressure which it connected at the time of heating operation as a four way valve 73 showed as a solid line, and was breathed out from the compressor 31 It is inhaled by the compressor 31, after radiating heat in the style of air-conditioning with the 2nd vehicle indoor heat exchanger 33, changing to liquid cooling intermediation of elevated-temperature high pressure, carrying out adiabatic expansion with the expansion means 34, becoming the two phases flow of low-temperature low voltage, flowing into the 1st vehicle indoor heat exchanger 35, carrying out the shell endothermic of the air-conditioning style here and

changing to the refrigerant gas of low-temperature low voltage. After the air-conditioning wind controlled by the predetermined inside-and-outside mind ratio is introduced by the blower fan 37 and cooled with the 1st vehicle indoor heat exchanger 35 (dehumidification), it is heated with the 2nd vehicle indoor heat exchanger 33. An engine cooling water flows into the heater core 202, outside air temperature and an engine load are comparatively high, heating operation according to an air-conditioner cycle when water temperature is sufficiently high is not performed, but heating operation by the air-conditioner cycle is performed according to the heater capacity which is insufficient when water temperature is low and heater performances run short.

[0053] If heating operation by the air-conditioner cycle is started at Step S101, at Step S102, each sensor value and an actuator output will be detected. Here, Tptc is [engine water temperature and Teva of setting temperature and Tw] the signals [concerning / Tvsc / the operation temperature of the 1st vehicle indoor heat exchanger 35, and / Tamb / the blow-off air temperature of the 2nd vehicle indoor heat exchanger 33, and] the engine performance state where in blower fan voltage and Xdef intake door opening and Xmix incorporate defroster door opening and Xint, and air mix door opening and Pd incorporate an air-conditioner cycle working pressure and a vehicles state signal from an engine control system 206, in outside air temperature and Tic

[0054] At Step S103, the degree Tof of target blow-off temperature is calculated based on the sensor value detected at Step S102.

[0055] At Step S104, an operation is calculated for the target heater entrance air temperature Toh from the temperature efficiency of the degree Tof of target blow-off temperature, the engine water temperature Tw, and the heater core 202.

[0056] At Step S105, it judges whether heating operation by the air-conditioner cycle is performed from the temperature gradient of the heater entrance air temperature Tvsc and the target heater entrance air temperature Toh. when the temperature gradient of the heater entrance air temperature Tvsc and the target heater entrance air temperature Toh is larger than a predetermined value, heating operation the target heater entrance air temperature Toh is high, and the actual heater entrance air temperature Tvsc is low, and according to an air-conditioner cycle performs (air-conditioner heating ON) -- ** -- it judges, and when the temperature gradient of the heater entrance air temperature Tvsc and the target heater entrance air temperature Toh is small than a predetermined value, heating operation by the air-conditioner cycle does not perform -- ** (air-conditioner heating OFF

[0057] At Step S106, it judges whether it became the air-conditioner heating OFF at Step S105, in the air-conditioner heating OFF, progresses at Step S107, and, in the

air-conditioner heating ON, progresses at Step S108.

[0058] Since heating operation by the air-conditioner cycle is not performed at Step S107, a compressor clutch is set as OFF, a motor 30 is set as OFF, and it progresses to Step S122.

[0059] At Step S108, when it judges whether engine-on is carried out and the engine run is being carried out for the run, it progresses to Step S119, and when that is not right, it progresses to Step S109. Since the engine 201 is operating in the field with the comparatively sufficient rate of mpg while carrying out engine-on for the run, it progresses to Step S119 preferentially, and heating operation by the air-conditioner cycle is performed by the engine drive.

[0060] At Step S109, it judges whether the space heating load in the case of performing heating operation by the air-conditioner cycle is large using the degree Tof of target blow-off temperature, or the target heater entrance air temperature Toh. For example, immediately after making a setting change of the time of the warm up just behind a heating start up, or the setting temperature at temperature high at a stretch etc., it is large, the heating capacity demanded is set to D when the degree Tof of target blow-off temperature or the target heater entrance air temperature Toh is larger than a predetermined value, and when that is not right, it is set to C.

[0061] At Step S110, it judges whether it was set to C at Step S109, or it was set to D, when it is C, it progresses to Step S111, and when it is D, in order to drive a compressor 31 with an engine 201 and to perform heating operation by the air-conditioner cycle, it progresses to Step S118.

[0062] At Step S111, the required compressor work Wcomp is calculated from the temperature gradient of air capacity, the target heater entrance air temperature Toh, and the heater entrance air temperature Tvsc. In heating operation of the air-conditioner cycle shown in drawing 1 , since a refrigerant is not poured to the vehicle outdoor heat exchanger 38 at the time of heating operation, the amount of endothermics from the open air in the vehicle outdoor heat exchanger 38 is zero, and the sum of the work energy of the heating value and compressor 31 which carry out an endothermic from an air-conditioning wind with the 1st vehicle indoor heat exchanger 35 radiates heat in the style of air-conditioning in the 2nd vehicle indoor heat exchanger 33. If this feature is used, the compressor work Wcomp which is needed from the temperature gradient of air capacity, the target heater entrance air temperature Toh, and the heater entrance air temperature Tvsc can be presumed.

[0063] It classifies into the state of H1-H3 according to Step S112 using the required compressor work Wcomp calculated at Step S111. When mount is considered, a motor

30 does not obtain a small fake colander from the restrictions on a layout, but a horsepower output also receives restrictions naturally. Therefore, in the field of H1 where the required compressor work Wcomp is small, priority is given to motorised, and in the field of H3 where the required compressor work Wcomp is large, priority is given to an engine drive and the middle chooses motorised or an engine drive on the basis of efficiency. the intermittent running according [the H1 region with the small required compressor work Wcomp] to ON/OFF by the engine drive -- not carrying out -- since it does not obtain but 10 degrees C or more of blow-off temperatures are changed by ON/OFF of a compressor, although a ** tone is the range made difficultly weak [heating operation by the engine drive], it is performing motorised, and a fine ** tone becomes possible, without causing aggravation of efficiency

[0064] At Step S113, it judges any should be chosen between H1-H3 at Step S112, and in the case of H1, it progresses to Step S116, in the case of H2, it progresses at Step S114, and, in the case of H3, progresses at Step S118.

[0065] The engine load at the time of motorised is obtained in consideration of many efficiency, such as motion efficiency, battery efficiency, and a motor efficiency. Therefore, as for the engine load to the same required compressor work Wcomp, motorised one becomes larger than an engine drive. However, it generates electricity using a field with the sufficient rate of mpg of an engine 201, and as for the field of a low rotational frequency and a low load with the bad rate of mpg of an engine 201, motorised becomes advantageous like an idle by carrying out motorised using this power, and an engine drive becomes advantageous like [at the time of a run] by the operating space with the comparatively sufficient rate of mpg of an engine 201.

[0066] At Step S114, it judges whether it is in an engine drive region, or it is in a motorised region from the engine speed at the time of the engine output torque and idle to the required compressor work Wcomp predicted at Step S111. The solid line in drawing is a profit-and-loss branch line the engine drive in consideration of efficiency, such as power generation, and motorised, motorised is advantageous in the low load region below this line, and an engine drive becomes advantageous in the heavy load region above this line. When it stops by signal under a severe winter, since motorised becomes advantageous, in except, the role of the idle stop system which stops the compressor drive with an engine at the time of an idle has been played.

[0067] At Step S115, it judges any should be chosen between the engine drive region and the motorised region at Step S114, when a motorised region is chosen, it progresses to Step S116, and when an engine drive region is chosen, it progresses to Step S118.

[0068] At Step S116, in consideration of a battery residue etc., it judges whether

motorised is possible, when motorised is possible, it progresses to Step S117, and by the reasons of the shortage of a battery residue etc., when motorised is impossible, it progresses to Step S118.

[0069] At Step S117, it is set as the compressor clutch OFF and Motor ON.

[0070] Since a compressor is driven, an engine-on demand is advanced by Step S118 to an engine control system 206.

[0071] At Step S119, it is set as Motor OFF.

[0072] The compressor control temperature Tcomp is set up at Step S120. The compressor control temperature Tcomp is set up in consideration of antifog [of outside air temperature or glass].

[0073] At Step S121, ON-OFF of a compressor 31 is chosen according to the temperature gradient of the operation temperature Teva of the 1st vehicle indoor heat exchanger 35, and the compressor control temperature Tcomp.

[0074] At Step S122, it is set as the intake door opening Xint which calculates intake door opening based on the degree Tof of target blow-off temperature.

[0075] At Step S123, it is set as the mix door opening Xmix which calculates mix door opening based on the degree Tof of target blow-off temperature.

[0076] At Step S124, it is set as the blower fan voltage Vfan which calculates blower fan voltage based on the degree Tof of target blow-off temperature.

[0077] At Step S125, after setting blow-off mode as the blow-off mode chosen based on the degree Tof of target blow-off temperature, it returns to Step S102 again, and the control at the time of heating operation is repeated.

[0078] According to the heating capacity which a heating demand is capable from the air-conditioning load of the vehicle interior of a room at the time of heating operation, and wants heater core water temperature for a low case, heating operation by the air-conditioner cycle with which it is compensated is performed. Generally, like an idle, motorised becomes advantageous and, as for the field of a low rotational frequency and a low load with the bad rate of mpg of an engine 201, an engine drive becomes advantageous like [at the time of a run] by the operating space with the comparatively sufficient rate of mpg of an engine 201. Therefore, at the time of a run, although it carried out with the gestalt of this operation at the time of a run when the engine drive of the compressor was carried out, when ****** and efficiency are considered depending on insufficient size and motor output of heating capacity, there is a bird clapper that it is more suitable to carry out heating operation by motorised rather than it carries out heating operation by the engine drive.

[0079] Drawing 2 - drawing 7 show another air-conditioner cycle composition in which

heating operation and air conditioning operation are possible. Of course, control of the above-mentioned example is applicable also about these air-conditioner cycles.

[0080] In the air-conditioner cycle shown in drawing 1 , the air-conditioner cycle shown in drawing 2 extracted the end (the outlet side at the time of heating, entrance side at the time of air conditioning) of the 2nd vehicle indoor heat exchanger 33, and the lower stream of a river of a check valve 70, and has connected them with 74 through a two way valve 75 on the bypass way 100. If a two way valve 75 is opened and closed at the time of air conditioning operation, since both the 1st vehicle indoor heat exchanger 35 and the 2nd vehicle indoor heat exchanger 33 will turn into an evaporator in the state of two-way-valve open and only the 1st vehicle indoor heat exchanger 35 will turn into an evaporator in a two-way-valve closed state, according to the cooling load of the vehicle interior of a room, it can carry out adjustable [of the endothermic capacity of a vehicle indoor evaporator]. At the time of heating operation, an evaporator and the 2nd vehicle indoor heat exchanger 33 turn into [the 1st vehicle indoor heat exchanger 35] a condenser.

[0081] In the air-conditioner cycle shown in drawing 1 , the air-conditioner cycle shown in drawing 3 extracted between an expansion valve 34 and the 1st vehicle indoor heat exchanger 35, and has connected it with the end (outlet side at the time of heating) of the 2nd vehicle indoor heat exchanger 33 through 80 on the bypass way 100. At the time of air conditioning operation, both the 1st vehicle indoor heat exchanger 35 and the 2nd vehicle indoor heat exchanger 33 turn into an evaporator, and an evaporator and the 2nd vehicle indoor heat exchanger 33 turn into [the 1st vehicle indoor heat exchanger 35] a condenser at the time of heating operation.

[0082] In the air-conditioner cycle which shows the air-conditioner cycle shown in drawing 4 to drawing 1 , to the 2nd vehicle indoor heat exchanger 33, a refrigerant does not flow at the time of air conditioning operation, but the 1st vehicle indoor heat exchanger 35 turns into an evaporator by the case where arrangement of the 1st vehicle indoor heat exchanger 35 and the 2nd vehicle indoor heat exchanger 33 is changed, and an evaporator and the 2nd vehicle indoor heat exchanger 33 turn into [the 1st vehicle indoor heat exchanger 35] a condenser at the time of heating operation.

[0083] By the case where the air-conditioner cycle shown in drawing 5 constitutes one vehicle indoor heat exchanger 101 from the 1st refrigerant path 77 and the 2nd refrigerant path 76 in the air-conditioner cycle shown in drawing 1 , at the time of air conditioning operation, the 1st refrigerant path 77 serves as an evaporator, and an evaporator and the 2nd refrigerant path 76 serve as [the 1st refrigerant path 77] the condensation section at the time of heating operation.

[0084] The air-conditioner cycle shown in drawing 6 shows the air-conditioner cycle composition at the time of using solenoid valves 81-83 instead of a four way valve 73 in the air-conditioner cycle shown in drawing 3 .

[0085] In the air-conditioner cycle shown in drawing 1 , the air-conditioner cycle shown in drawing 7 adds the drawing means 111, and shows the air-conditioner cycle composition at the time of making it the 2nd vehicle indoor heat exchanger 33 turn into a condenser at the time of an evaporator and heating operation at the time of air conditioning operation. After becoming an evaporator also at the time of the time of air conditioning operation, and heating operation, extracting the 1st vehicle indoor heat exchanger 35 at the time of air conditioning operation and decompressing with a means 111, the low-temperature refrigerant which extracted further and was decompressed with the means 34 flows, and the low-temperature refrigerant which extracted at the time of heating operation and was decompressed with the means 34 flows. In addition, the drawing means 111 is made to bypass at the time of air conditioning operation, and it is good also considering a condenser and the 1st vehicle indoor heat exchanger 35 as an evaporator in the 2nd vehicle indoor heat exchanger 33, or you may make it the low-temperature refrigerant which was made to bypass a throttle valve 34, extracted and was decompressed with the means 111 flow into both the 1st vehicle indoor heat exchanger 35 and the 2nd vehicle indoor heat exchanger 33.

[0086] Drawing 16 - drawing 19 show the flows of control in the case of performing air conditioning operation in the air-conditioner cycle shown in drawing 1 - drawing 7 , or the air-conditioner cycle which performs only air conditioning operation as shown in drawing 15 .

[0087] To performing only heating operation by the air-conditioner cycle with which it is compensated according to the heating capacity which a heating demand is capable from the air-conditioning load of the vehicle interior of a room at the time of heating operation, and wants heater core water temperature for a low case, if there is an air conditioning demand from the air-conditioning load of the vehicle interior of a room at the time of air conditioning operation, air conditioning operation by the air-conditioner cycle will be carried out. Like the time of heating operation, like an idle, motorised becomes advantageous and, as for the field of a low rotational frequency and a low load with the bad rate of mpg of an engine 201, an engine drive becomes advantageous like [at the time of a run] by the operating space with the comparatively sufficient rate of mpg of an engine 201.

[0088] For example, air conditioning operation of the air-conditioner cycle of drawing 1 is as follows. Connecting, as a four way valve 73 shows a dashed line, the refrigerant gas

of elevated-temperature high pressure breathed out from the compressor 31 flows into the vehicle outdoor heat exchanger 38, radiates heat in the open air here, and changes to liquid cooling intermediation of elevated-temperature high pressure. Then, adiabatic expansion is carried out with the expansion means 34, it becomes the two phases flow of low-temperature low voltage, and flows into the 1st vehicle indoor heat exchanger 35, the shell endothermic of the air-conditioning style is carried out here, and it changes to the refrigerant gas of low-temperature low voltage, and is inhaled by the compressor 31. To the 2nd vehicle indoor heat exchanger 33, a refrigerant does not flow at the time of air conditioning operation. After being cooled with the 1st vehicle indoor heat exchanger 35 (dehumidification), are RIHITO [to predetermined temperature / the heater core 202] the air-conditioning wind introduced by the blower fan 37, and it blows off to the vehicle interior of a room.

[0089] If heating operation by the air-conditioner cycle is started at Step S201, at Step S202, each sensor value and an actuator output will be detected. Here, Tptc is setting temperature and Tw is a signal [concerning / Teva / engine water temperature and / Tamb / the operation temperature of the 1st vehicle indoor heat exchanger 35, and / Vfan / the engine performance state where in blower fan voltage and Xdef intake door opening and Xmix incorporate defroster door opening and Xint, and air mix door opening and Pd incorporate an air-conditioner cycle working pressure and a vehicles state signal from an engine control system 206, in outside air temperature and Tic] concerning [a room temperature and Qsun] intensity of radiation.

[0090] At Step S203, the degree Tof of target blow-off temperature is calculated based on the sensor value detected at Step S202.

[0091] At Step S204, Compressor ON and Compressor OFF are chosen according to the temperature gradient of the operation temperature Teva of the 1st vehicle indoor heat exchanger 35, and the degree Tof of target blow-off temperature, or the temperature gradient of the operation temperature Teva and alpha of the 1st vehicle indoor heat exchanger 35 (temperature set up beforehand).

[0092] At Step S205, it judges whether Compressor ON was chosen at Step S204, when Compressor ON is chosen, it progresses to Step S207, and when Compressor OFF is chosen, it progresses to Step S206.

[0093] At Step S206, it is set as the compressor clutch OFF and Motor OFF.

[0094] At Step S207, since it is [efficiency] better to carry out an engine drive when it judges whether engine-on is carried out and engine-on is being carried out for the run for the run, it progresses to Step S217.

[0095] At Step S208, like [it is smaller than a predetermined value and / at the time of

cooling-down], the degree Tof of target blow-off temperature chooses B, when it is larger than A and a predetermined value conversely when a cooling load is large, and a cooling load is not comparatively large.

[0096] At Step S209, it judges any should be chosen between A and B at Step S208, when A is chosen, it progresses to Step S216, and when B is chosen, it progresses to Step S210.

[0097] At Step S210, the compressor drive load Wcomp at the time of assuming that an engine drive is carried out is presumed from the engine speed at the time of the air-conditioner cycle working pressure Pd and an idle.

[0098] At Step S211, the engine output torque to the compressor drive load Wcomp presumed at Step S210 is calculated.

[0099] At Step S212, it judges whether it is in an engine drive region, or it is in a motorised region from the engine speed at the time of the engine output torque and idle to the compressor drive load Wcomp. The solid line in drawing is a profit-and-loss branch line the engine drive in consideration of efficiency, such as power generation, and motorised, motorised is advantageous in the low load region below this line, and an engine drive becomes advantageous in the heavy load region above this line. When it stops by signal under the blazing heat of midsummer, since motorised becomes advantageous, in except, the role of the idle stop system which stops the compressor drive with an engine at the time of an idle has been played.

[0100] At Step S213, it judges any should be chosen between the engine drive region and the motorised region at Step S212, when a motorised region is chosen, it progresses to Step S214, and when an engine drive region is chosen, it progresses to Step S216.

[0101] At Step S214, in consideration of a battery residue etc., it judges whether motorised is possible, when motorised is possible, it progresses to Step S215, and by the reasons of the shortage of a battery residue etc., when motorised is impossible, it progresses to Step S216.

[0102] At Step S215, it is set as the compressor clutch OFF and Motor ON.

[0103] Since a compressor is driven, an engine-on demand is advanced by Step S216 to an engine control system 206.

[0104] At Step S217, it is set as the compressor clutch ON and Motor OFF.

[0105] At Step S218, it is set as the intake door opening Xint which calculates intake door opening based on the degree Tof of target blow-off temperature.

[0106] At Step S219, it is set as the mix door opening Xmix which calculates mix door opening based on the degree Tof of target blow-off temperature.

[0107] At Step S220, it is set as the blower fan voltage Vfan which calculates blower fan

voltage based on the degree Tof of target blow-off temperature.

[0108] At Step S221, after setting blow-off mode as the blow-off mode chosen based on the degree Tof of target blow-off temperature, it returns to Step S202 again, and the control at the time of air conditioning operation is repeated.

[0109] Although the air conditioner for vehicles shown in drawing 1 was made into the example and the form of this operation explained it, the same effect is acquired also in the air-conditioner cycle shown in drawing 2 - drawing 7 , or the air-conditioner cycle which combined these.

[0110] Moreover, although the case where only a front was equipped with an air-conditioner was made into the example and the form of this operation explained, the same effect can be acquired when a front and RIA are equipped with an air-conditioner.

[0111] Moreover, although one apparatus with which the compressor and the motor were united was made into the example and explained, as shown in drawing 8 , when the motor which can drive a compressor with another object is used, the same effect is acquired, and it becomes possible to change the specification of a motor easily according to the specification of vehicles, such as battery capacity and body size.

[0112] Moreover, as for a compressor, the same effect is acquired also by the fixed capacity type compressor or the variable-capacity type compressor.

[0113]

[Effect of the Invention] Since according to the air conditioner for vehicles of this invention the air-conditioning state of the vehicle interior of a room can be maintained and a compressor is moreover driven in the direction with the sufficient efficiency an engine drive and motorised even if it suspends an engine while the compressor drive by the motor is chosen so that the above explanation may show, aggravation of the vehicle indoor amenity under engine shutdown can be prevented, and aggravation of the mpg by the air-conditioner can be mitigated.

[0114] Generally, like an idle, motorised becomes advantageous, and like [at the time of a run], since an engine drive becomes advantageous, the field of a a low rotational frequency and a low load with the bad rate of mpg of an engine can reduce the engine operation for a compressor drive, and it can be it is the optimal system for a hybrid car or an idle stop vehicle, and especially satisfied [field / with an operating space with the comparatively sufficient rate of mpg of an engine] of the engine shutdown demand of vehicles

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram of the gestalt of 1 operation of the air conditioner for vehicles by this invention.

[Drawing 2] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 3] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 4] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 5] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 6] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 7] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 8] It is drawing showing the compressor drive method of the gestalt another operation.

[Drawing 9] They are the flows of control of operation non-operating control of an engine.

[Drawing 10] They are the flows of control in the case of performing heating operation by the air-conditioner cycle.

[Drawing 11] They are the flows of control in the case of performing heating operation by the air-conditioner cycle.

[Drawing 12] They are the flows of control in the case of performing heating operation by the air-conditioner cycle.

[Drawing 13] They are the flows of control in the case of performing heating operation by the air-conditioner cycle.

[Drawing 14] They are the flows of control in the case of performing heating operation by the air-conditioner cycle.

[Drawing 15] It is the outline block diagram of the air-conditioner cycle of the gestalt of another operation.

[Drawing 16] They are the flows of control in the case of performing air conditioning operation by the air-conditioner cycle.

[Drawing 17] They are the flows of control in the case of performing air conditioning operation by the air-conditioner cycle.

[Drawing 18] They are the flows of control in the case of performing air conditioning operation by the air-conditioner cycle.

[Drawing 19] They are the flows of control in the case of performing air conditioning

operation by the air-conditioner cycle.

[Description of Notations]

30 Motor

31 Compressor

33 2nd Vehicle Indoor Heat Exchanger

34 Expansion Means

35 1st Vehicle Indoor Heat Exchanger

37 Blower Fan

38 Vehicle Outdoor Heat Exchanger

39 Duct

40 Bashful Inlet

41 Open Air Inlet

42 Intake Door

43 Control Unit

44 Blower Fan Motor

46 Air Mix Door

47 Air Mix Chamber

51 Ventilator Outlet

52 Defroster Outlet

53 Foot Outlet

55 Ventilator Door

56 Defroster Door

57 Foot Door

59 1st Vehicle Indoor Heat Exchanger Operation Temperature Sensor

60 2nd Vehicle Indoor Heat Exchanger Blow-Off Air Temperature Sensor

61 Intensity-of-Radiation Sensor

62 Outside-Air-Temperature Sensor

63 Room Temperature Sensor

64 Room Temperature Setter

65 Outlet Mode Switch

66 Blower Fan Motor Switch

70 71 Check valve

73 Four Way Valve

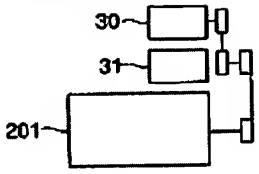
74 Drawing Means

75 Two Way Valve

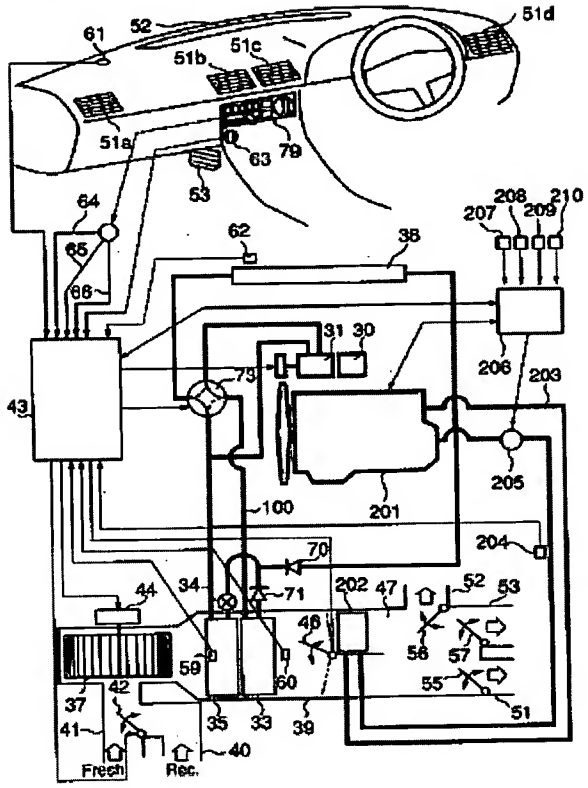
76 2nd Refrigerant Path

77 1st Refrigerant Path
80 Drawing Means
81, 82, 83 Two way valve
100 Bypass Way
101 Indoor Heat Exchanger
111 Drawing Means
201 Engine
202 Heater Core
203 Engine-Cooling-Water Piping
204 Engine-Cooling-Water ** Sensor
205 Electric Water Pump
206 Engine Control System
207 Throttle Opening Sensor
208 Vehicle Speed Sensor
209 Engine Speed Sensor
210 Run Mode Sensor

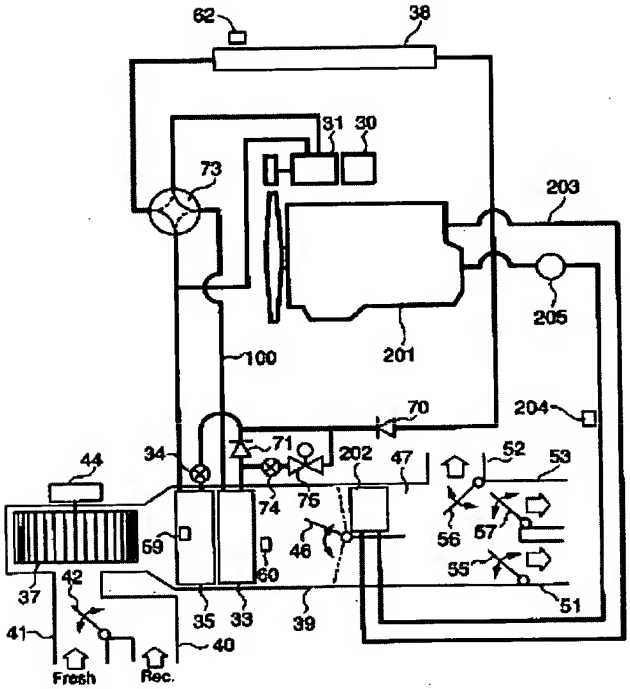
[Drawing 8]



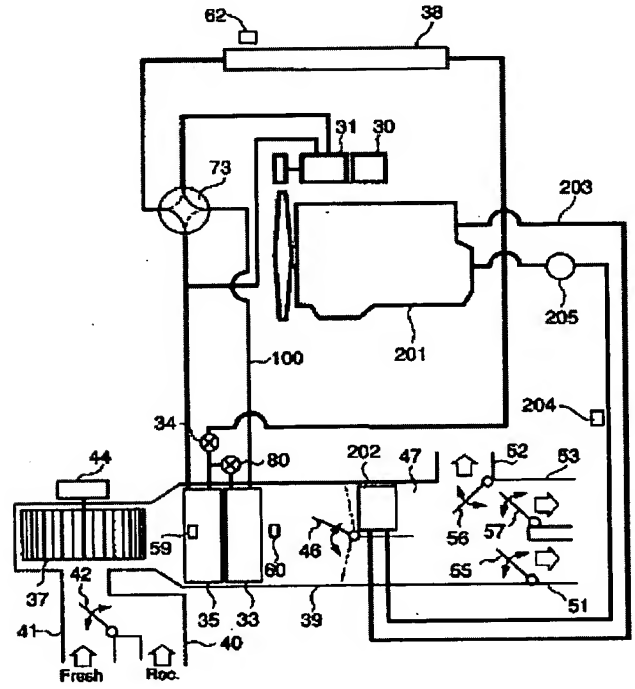
[Drawing 1]



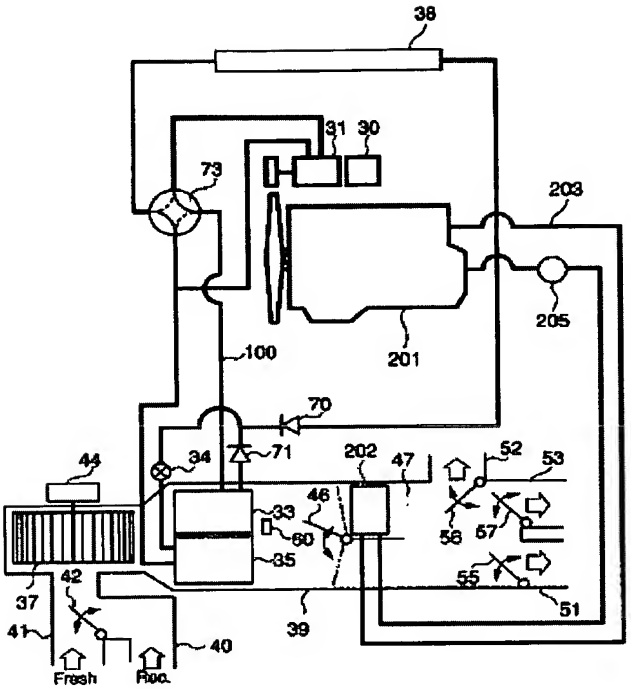
[Drawing 2]



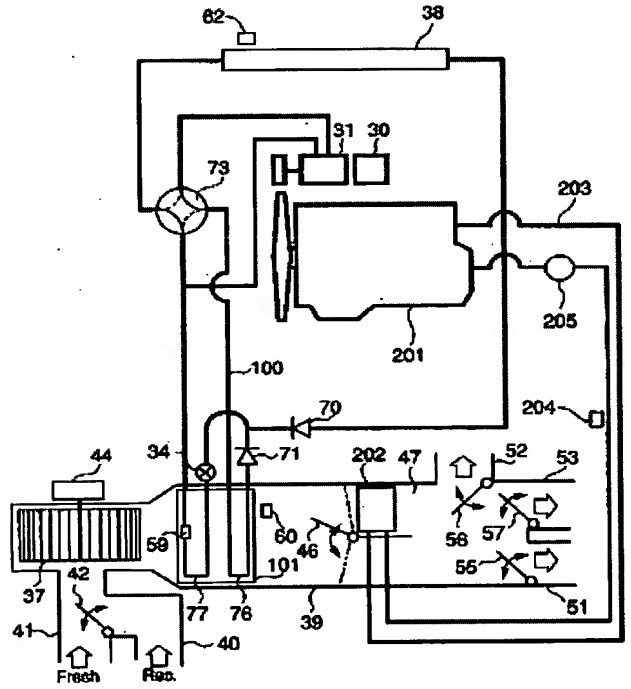
[Drawing 3]



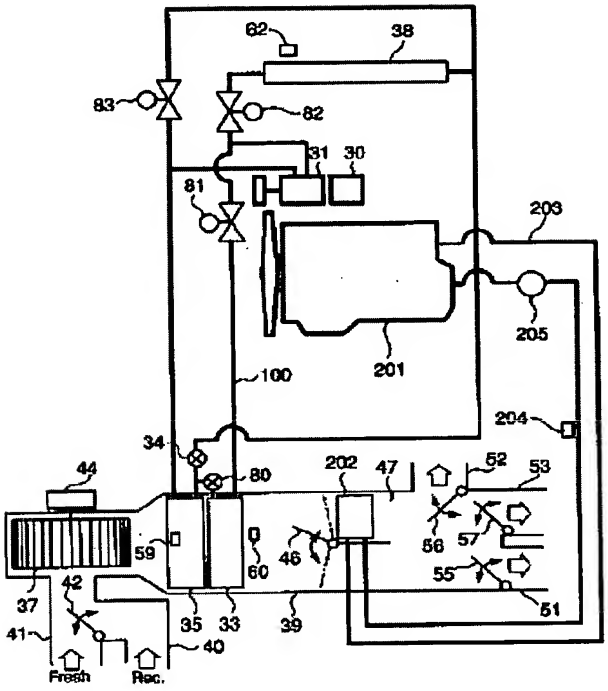
[Drawing 4]



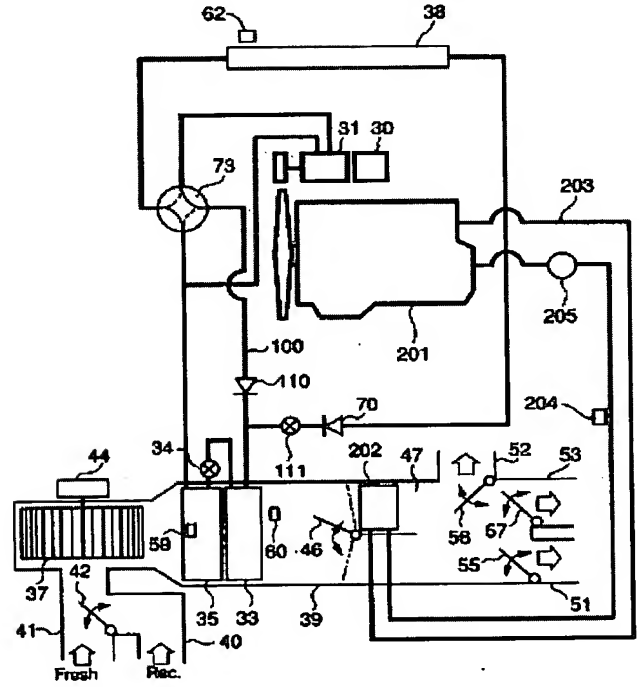
[Drawing 5]



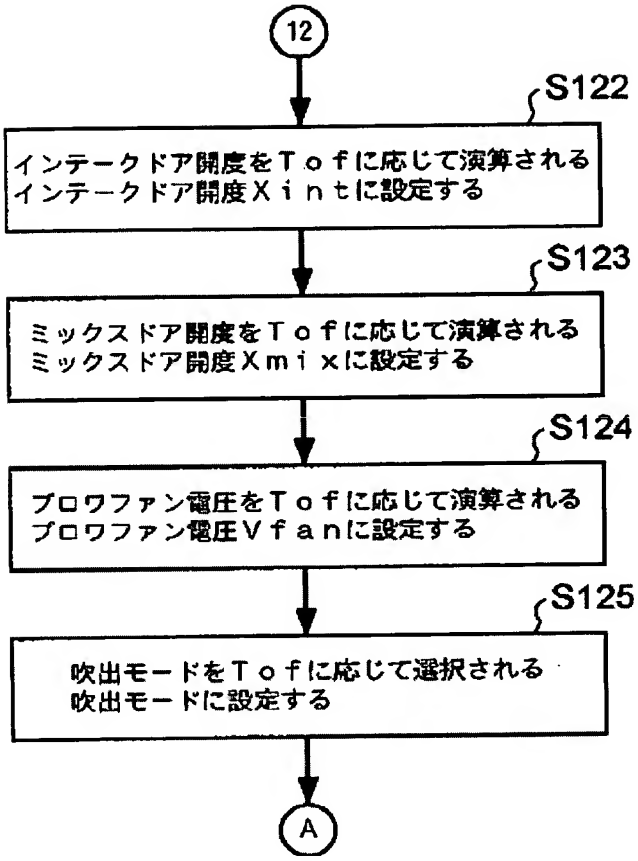
[Drawing 6]



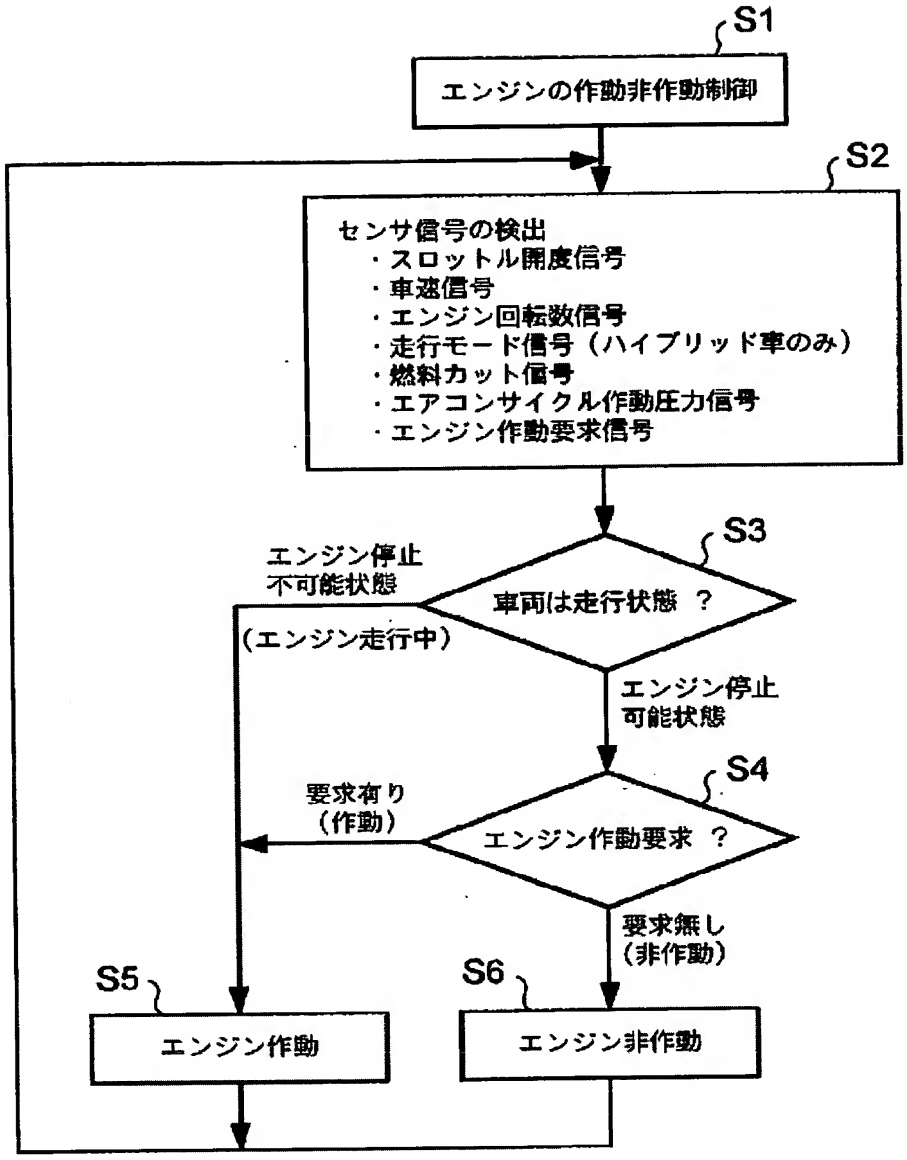
[Drawing 7]



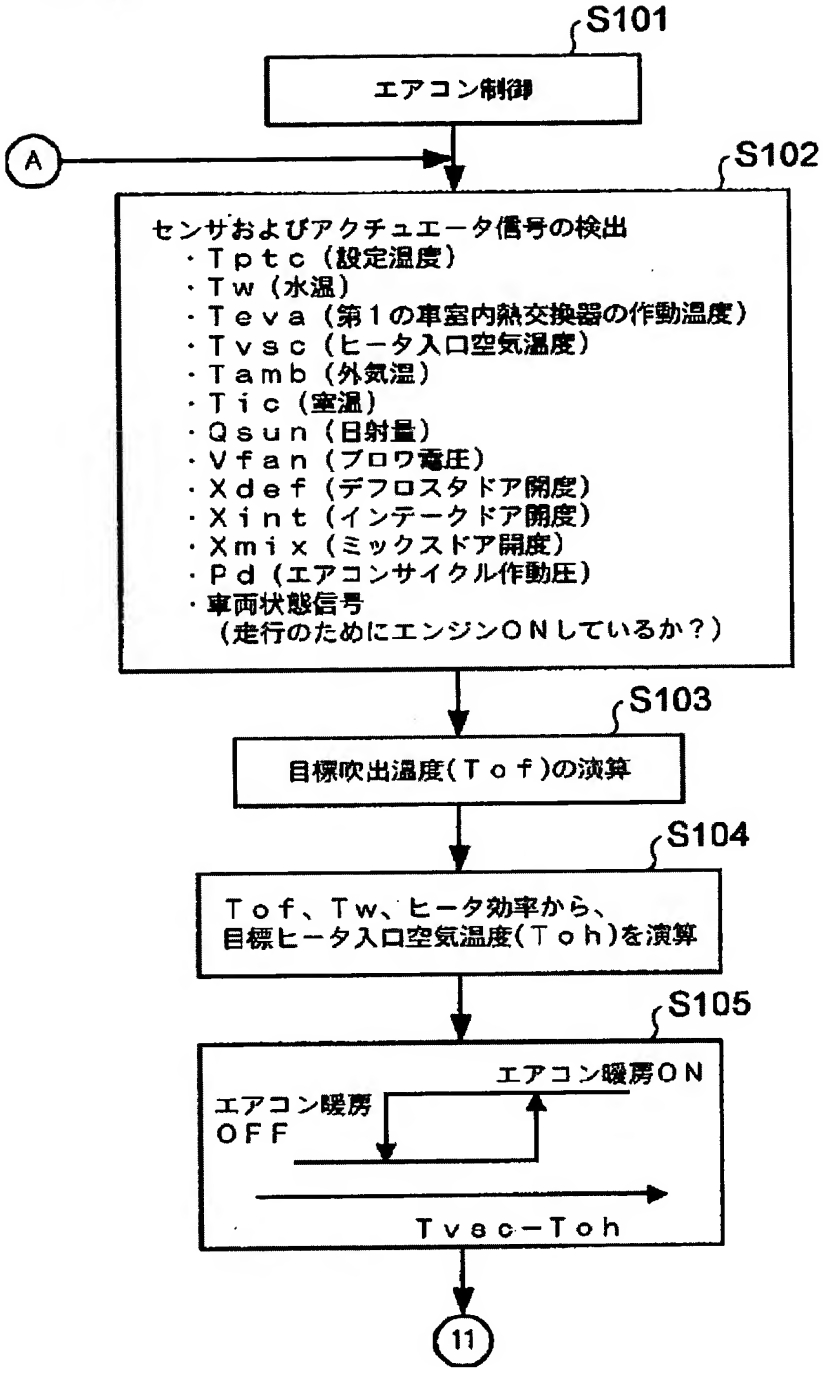
[Drawing 14]


12
S122
インテークドア開度をＴｏｆに応じて演算される
インテークドア開度Ｘｉｎｔに設定する
S123
ミックスドア開度をＴｏｆに応じて演算される
ミックスドア開度Ｘｍｉｘに設定する
S124
ブロワファン電圧をＴｏｆに応じて演算される
ブロワファン電圧Ｖｆａｎに設定する
S125
吹出モードをＴｏｆに応じて選択される
吹出モードに設定する
A

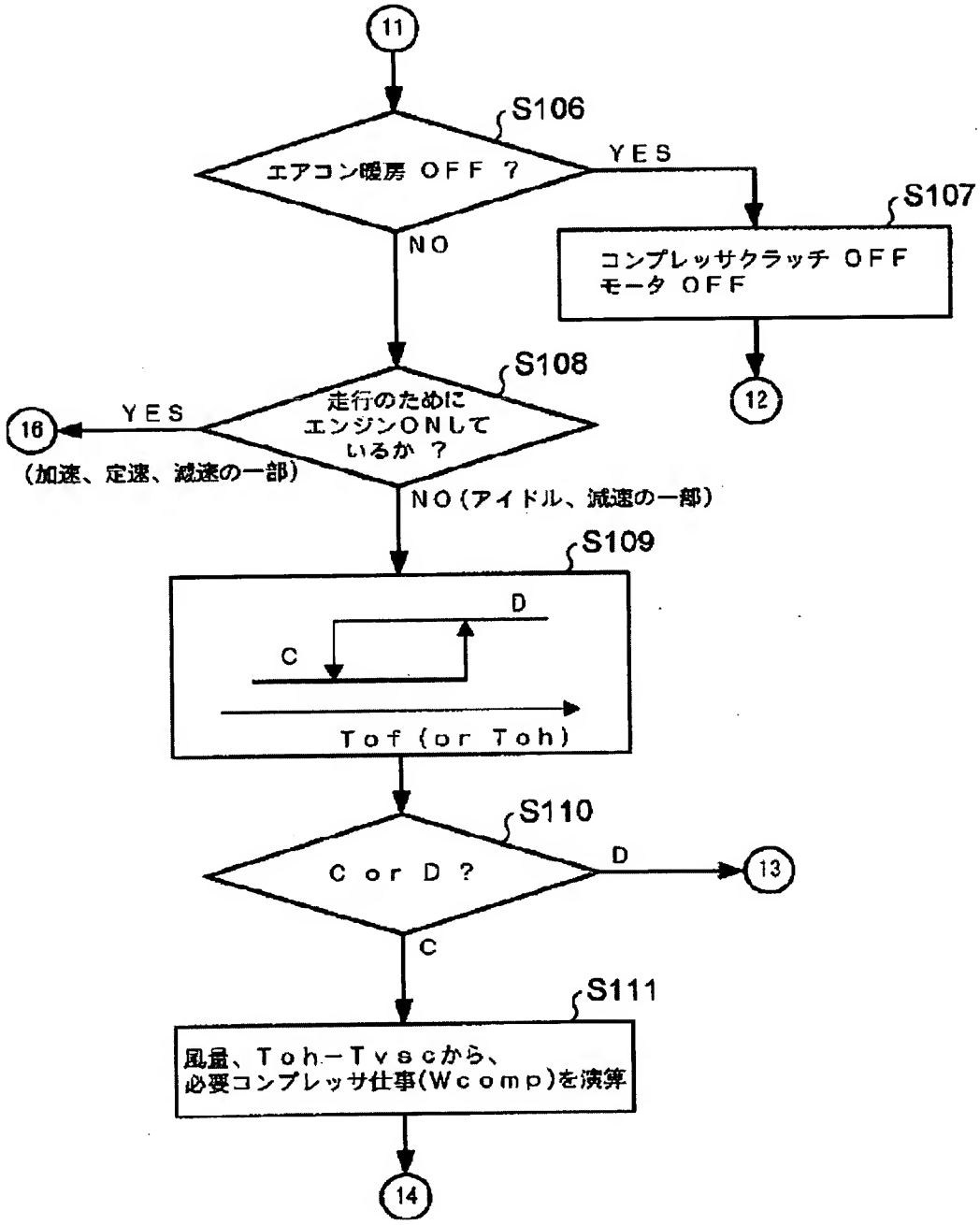
[Drawing 9]


S1
エンジンの作動非作動制御
S2
センサ信号の検出
・スロットル開度信号
・車速信号
・エンジン回転数信号
・走行モード信号（ハイブリッド車のみ）
・燃料カット信号
・エアコンサイクル作動圧力信号
・エンジン作動要求信号
S3
エンジン停止
不可能状態
車両は走行状態 ？
（エンジン走行中）
エンジン停止
可能状態
S4
要求有り
（作動）
エンジン作動要求 ？
要求無し
（非作動）
S5
エンジン作動
S6
エンジン非作動

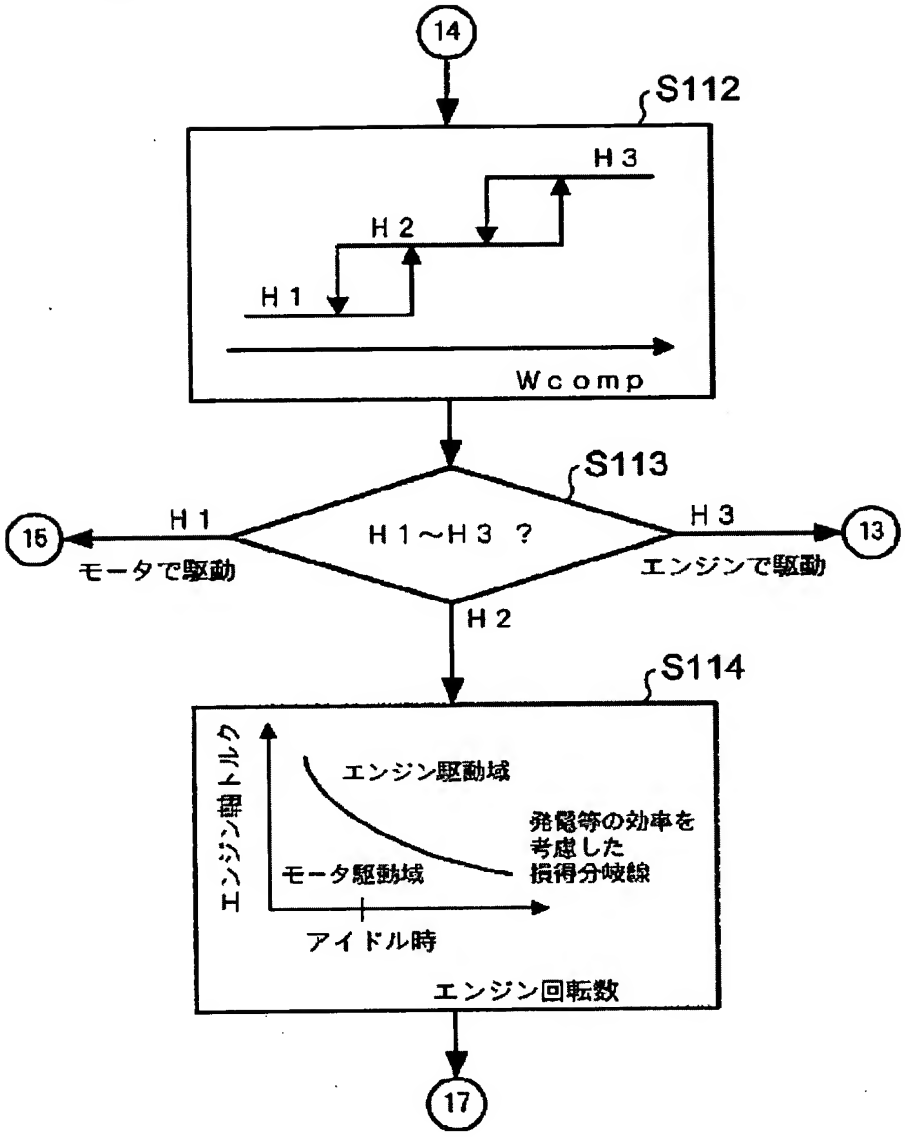
[Drawing 10]


S101
エアコン制御
A
S102
センサおよびアクチュエータ信号の検出
・Ｔｐｔｃ（設定温度）
・Ｔｗ（水温）
・Ｔｅｖａ（第１の車室内熱交換器の作動温度）
・Ｔｖｓｃ（ヒータ入口空気温度）
・Ｔａｍｂ（外気温）
・Ｔｉｃ（室温）
・Ｑｓｕｎ（日射量）
・Ｖｆａｎ（ブロワ電圧）
・Ｘｄｅｆ（デフロスタドア開度）
・Ｘｉｎｔ（インテークドア開度）
・Ｘｍｉｘ（ミックスドア開度）
・Ｐｄ（エアコンサイクル作動圧）
・車両状態信号
（走行のためにエンジンＯＮしているか？）
S103
目標吹出温度（Ｔｏｆ）の演算
S104
Ｔｏｆ、Ｔｗ、ヒータ効率から、
目標ヒータ入口空気温度（Ｔｏｈ）を演算
S105
エアコン暖房ＯＮ
エアコン暖房
ＯＦＦ
Ｔｖｓｃ－Ｔｏｈ
11

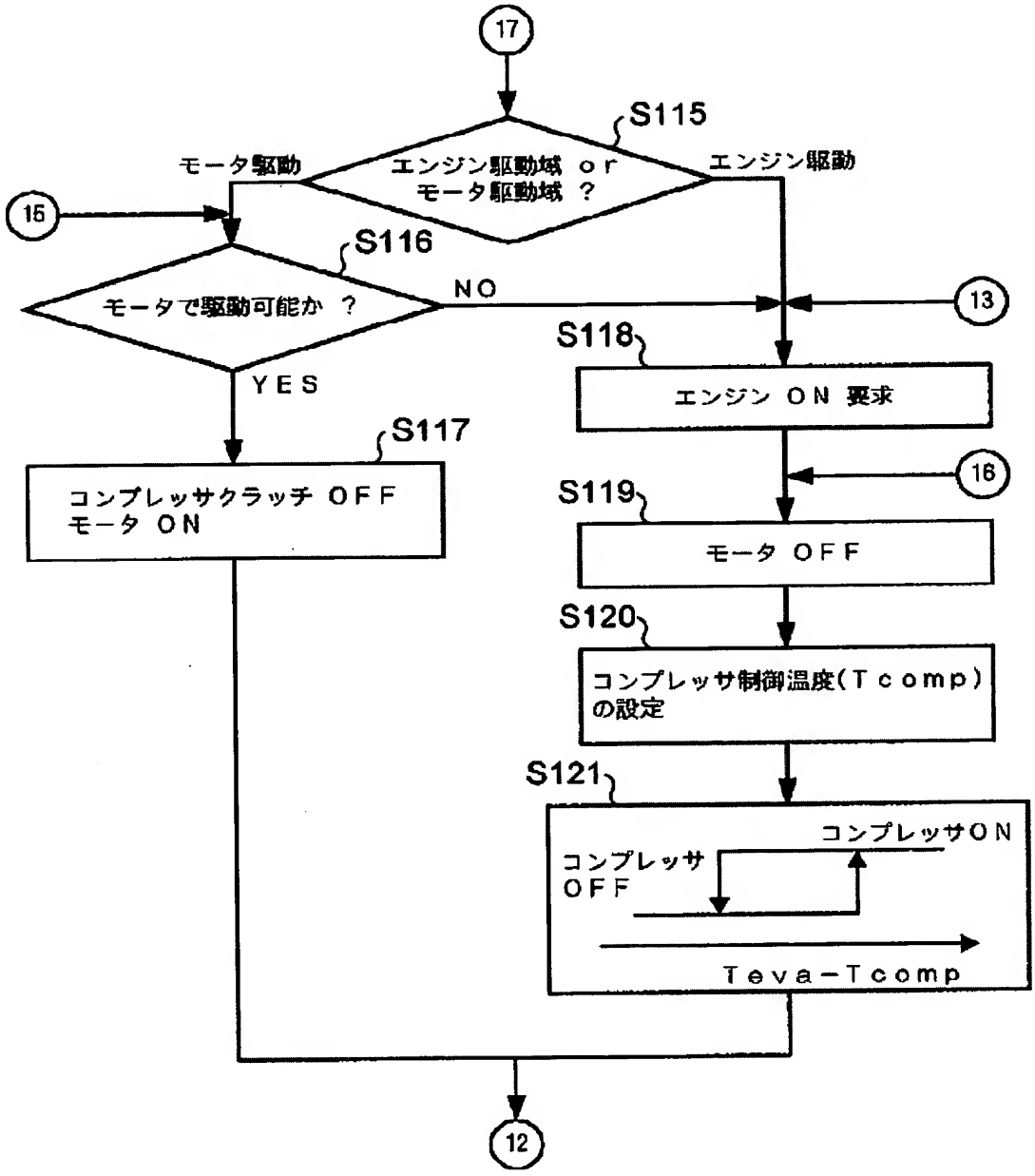
[Drawing 11]


11
S106
エアコン暖房 OFF ？
YES
S107
コンプレッサクラッチ OFF
モータ OFF
12
NO
S108
走行のために
エンジンONして
いるか ？
YES
16
（加速、定速、減速の一部）
NO（アイドル、減速の一部）
S109
D
C
Tof (or Toh)
S110
C or D ？
D
13
C
S111
風量、Toh－Tvscから、
必要コンプレッサ仕事(Wcomp)を演算
14

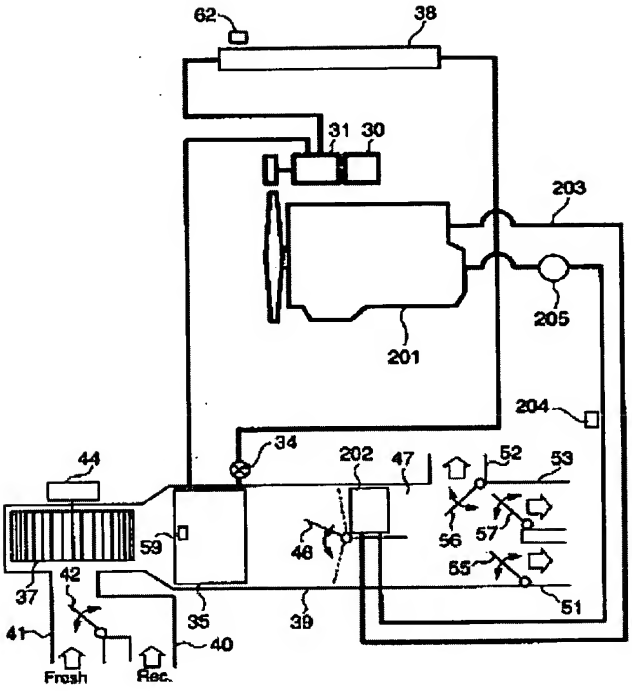
[Drawing 12]


14
S112
H3
H2
H1
Wcomp
S113
H1
H1～H3 ？
H3
15
13
モータで駆動
エンジンで駆動
H2
S114
エンジン駆動域
発電等の効率を
考慮した
損得分岐線
モータ駆動域
アイドル時
エンジン回転数
17

[Drawing 13]


17
S115
モータ駆動
エンジン駆動域 or
モータ駆動域 ？
エンジン駆動
15
S116
モータで駆動可能か ？
NO
13
YES
S118
エンジン ON 要求
S117
コンプレッサクラッチ OFF
モータ ON
16
S119
モータ OFF
S120
コンプレッサ制御温度(Tcomp)
の設定
S121
コンプレッサON
コンプレッサ
OFF
Teva−Tcomp
12

[Drawing 15]


62
38
31
30
203
205
201
204
34
202
47
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42
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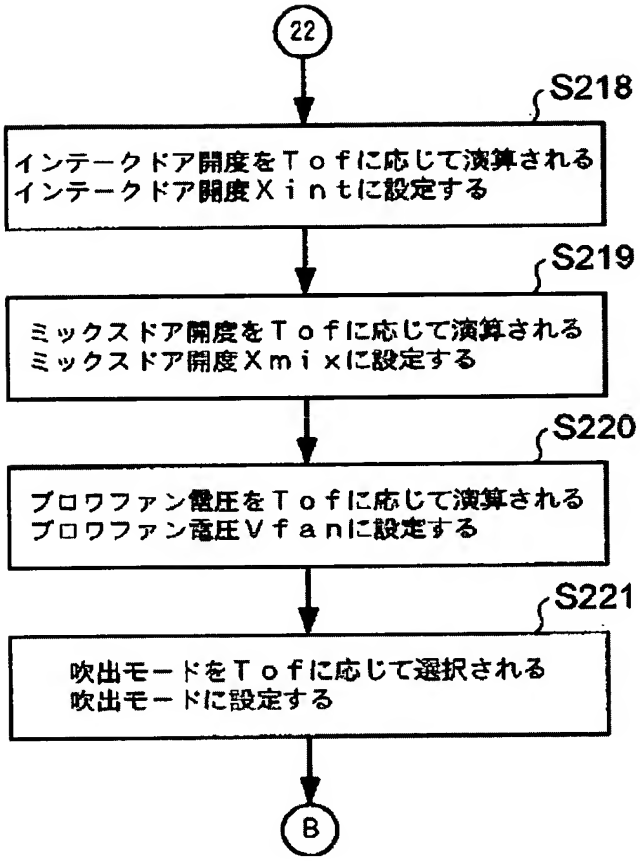
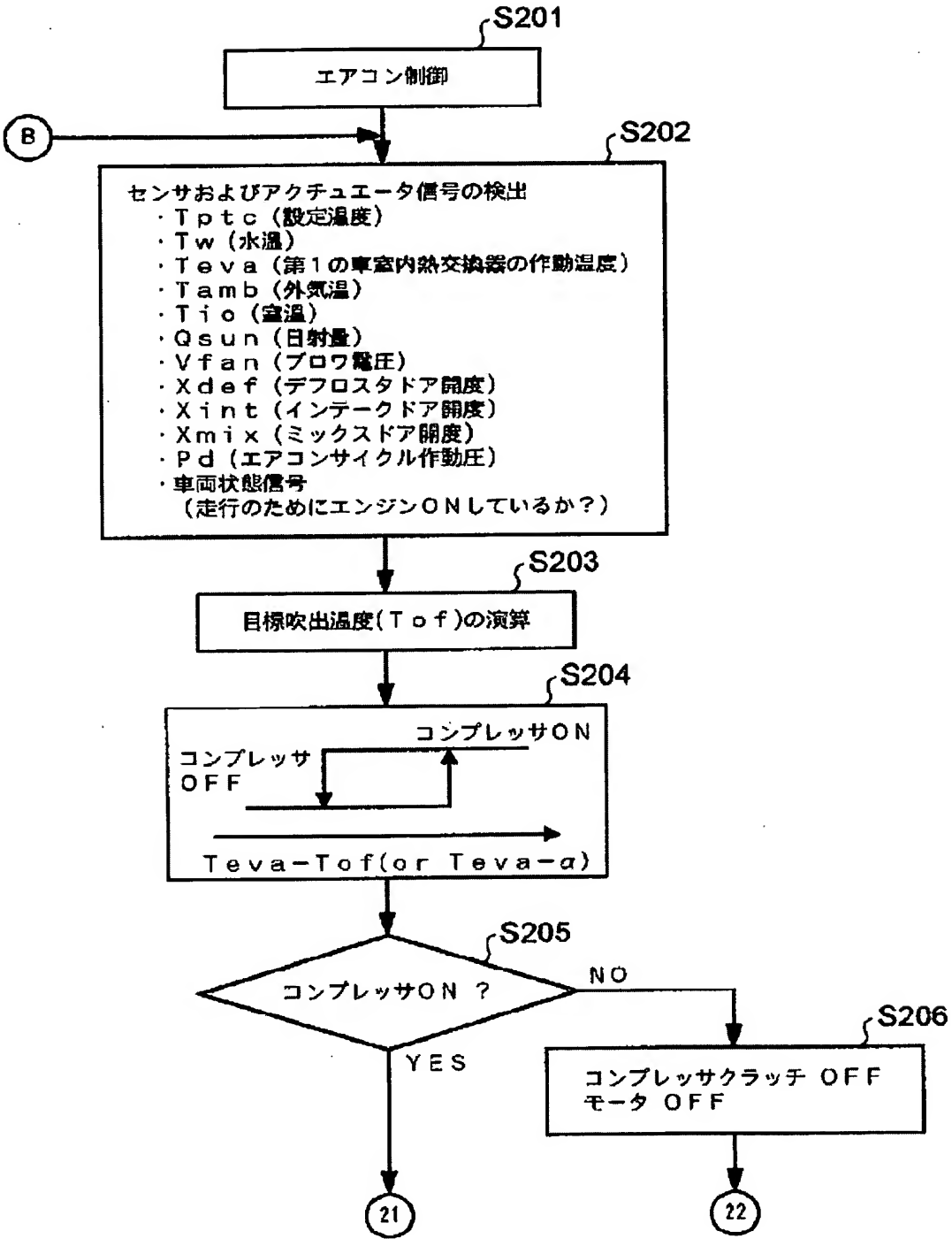
39
40
Fresh
Rec.

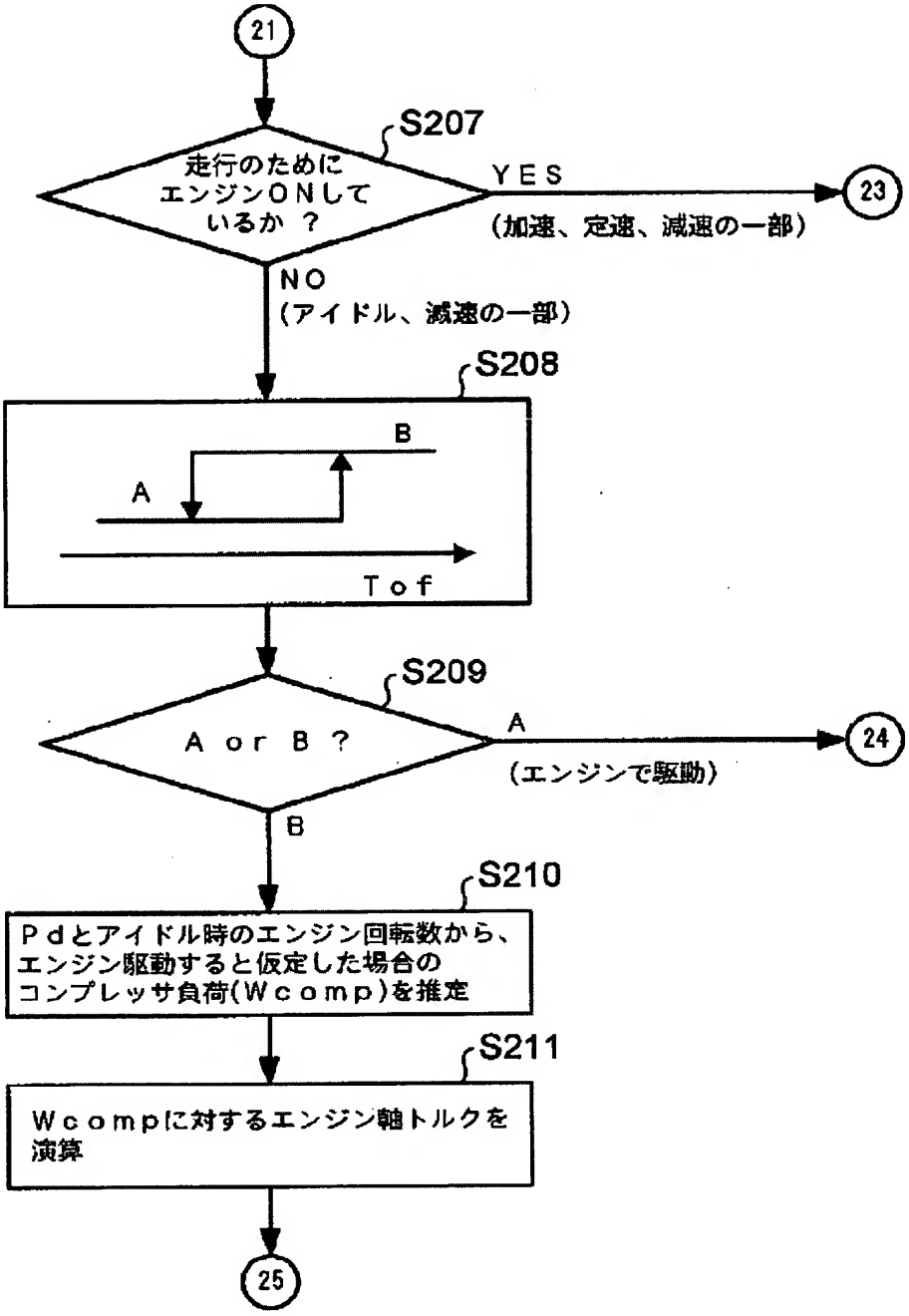
[Drawing 19]


22
S218
インテークドア開度をＴｏｆに応じて演算される
インテークドア開度Ｘｉｎｔに設定する
S219
ミックスドア開度をＴｏｆに応じて演算される
ミックスドア開度Ｘｍｉｘに設定する
S220
ブロワファン電圧をＴｏｆに応じて演算される
ブロワファン電圧Ｖｆａｎに設定する
S221
吹出モードをＴｏｆに応じて選択される
吹出モードに設定する
B

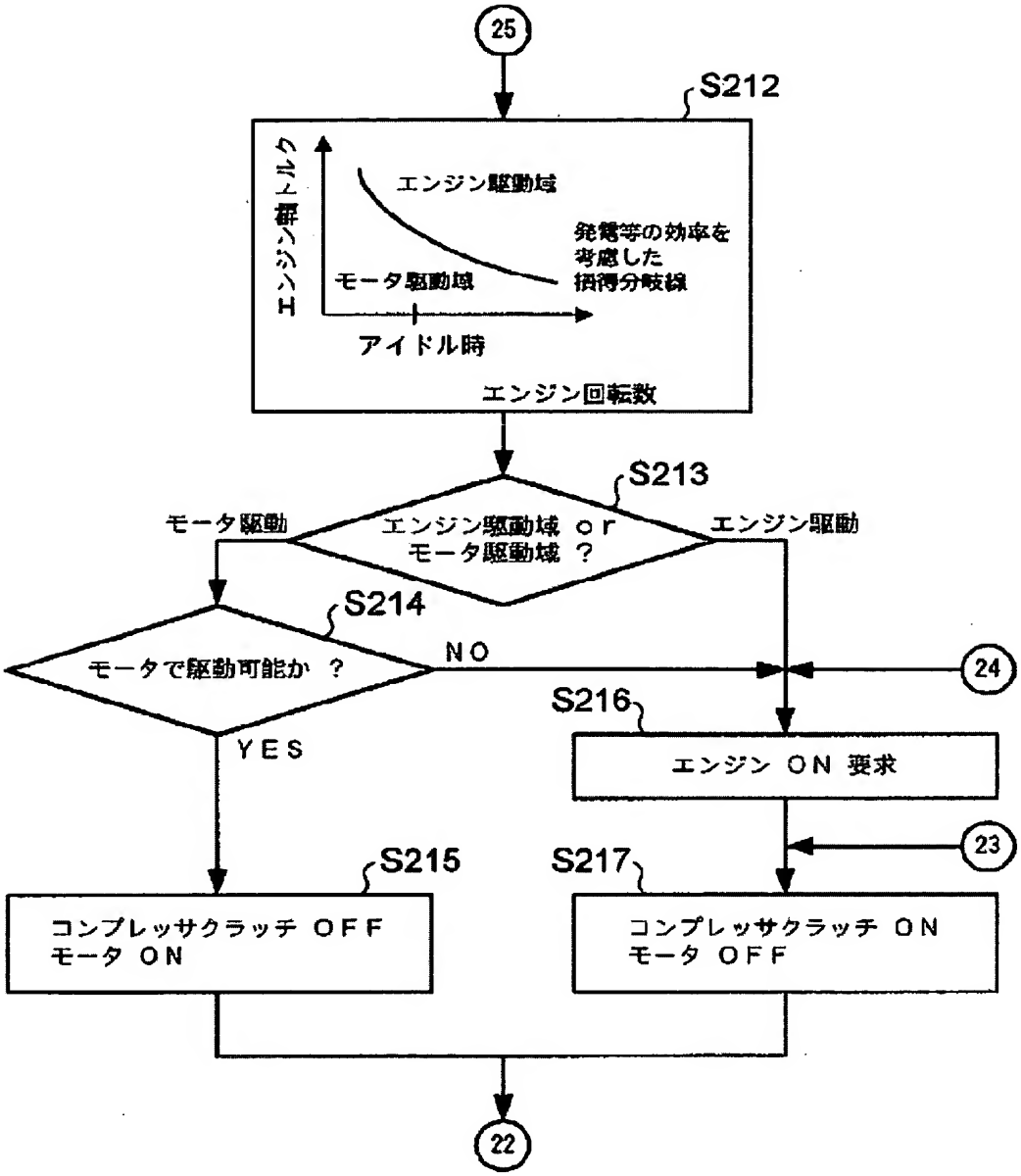
[Drawing 16]


S201
エアコン制御
B
S202
センサおよびアクチュエータ信号の検出
・Tptc（設定温度）
・Tw（水温）
・Teva（第1の車室内熱交換器の作動温度）
・Tamb（外気温）
・Tio（室温）
・Qsun（日射量）
・Vfan（ブロワ電圧）
・Xdef（デフロスタドア開度）
・Xint（インテークドア開度）
・Xmix（ミックスドア開度）
・Pd（エアコンサイクル作動圧）
・車両状態信号
（走行のためにエンジンONしているか？）
S203
目標吹出温度(Tof)の演算
S204
コンプレッサON
コンプレッサ
OFF
Teva-Tof(or Teva-α)
S205
コンプレッサON ？
NO
YES
S206
コンプレッサクラッチ OFF
モータ OFF
21
22

[Drawing 17]


21
S207
走行のためにエンジンONしているか ？
YES
(加速、定速、減速の一部)
23
NO
(アイドル、減速の一部)
S208
B
A
Tof
S209
A or B ？
A
(エンジンで駆動)
24
B
S210
Pdとアイドル時のエンジン回転数から、エンジン駆動すると仮定した場合のコンプレッサ負荷(Wcomp)を推定
S211
Wcompに対するエンジン軸トルクを演算
25

[Drawing 18]


25
S212
エンジン駆動域
発電等の効率を
考慮した
損得分岐線
モータ駆動域
エンジン軸トルク
H
アイドル時
エンジン回転数
S213
モータ駆動
エンジン駆動域 or
モータ駆動域 ？
エンジン駆動
S214
モータで駆動可能か ？
NO
24
YES
S216
エンジン ON 要求
23
S215
S217
コンプレッサクラッチ OFF
モータ ON
コンプレッサクラッチ ON
モータ OFF
22